US EPA's Office of Research and Development (ORD) Science and Technical Capabilities

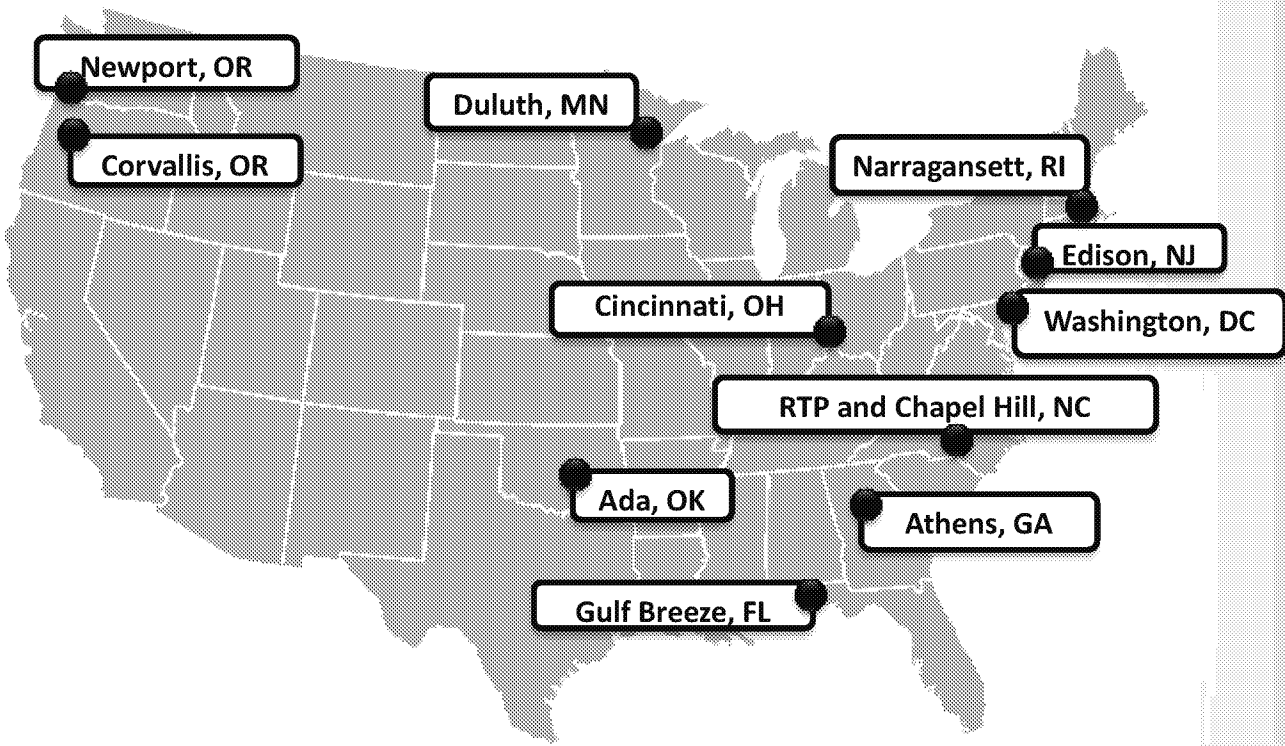
Jennifer Orme-Zavaleta
ORD Principal Deputy Assistant Administrator for Science

Region 6 State and Tribal Environmental Leaders' Visit
August 14, 2018

ORD At A Glance

Our Mission

Provide the science, technical support, technology and tools to inform US EPA's mission to protect public health and the environment



1,514 full time equivalents

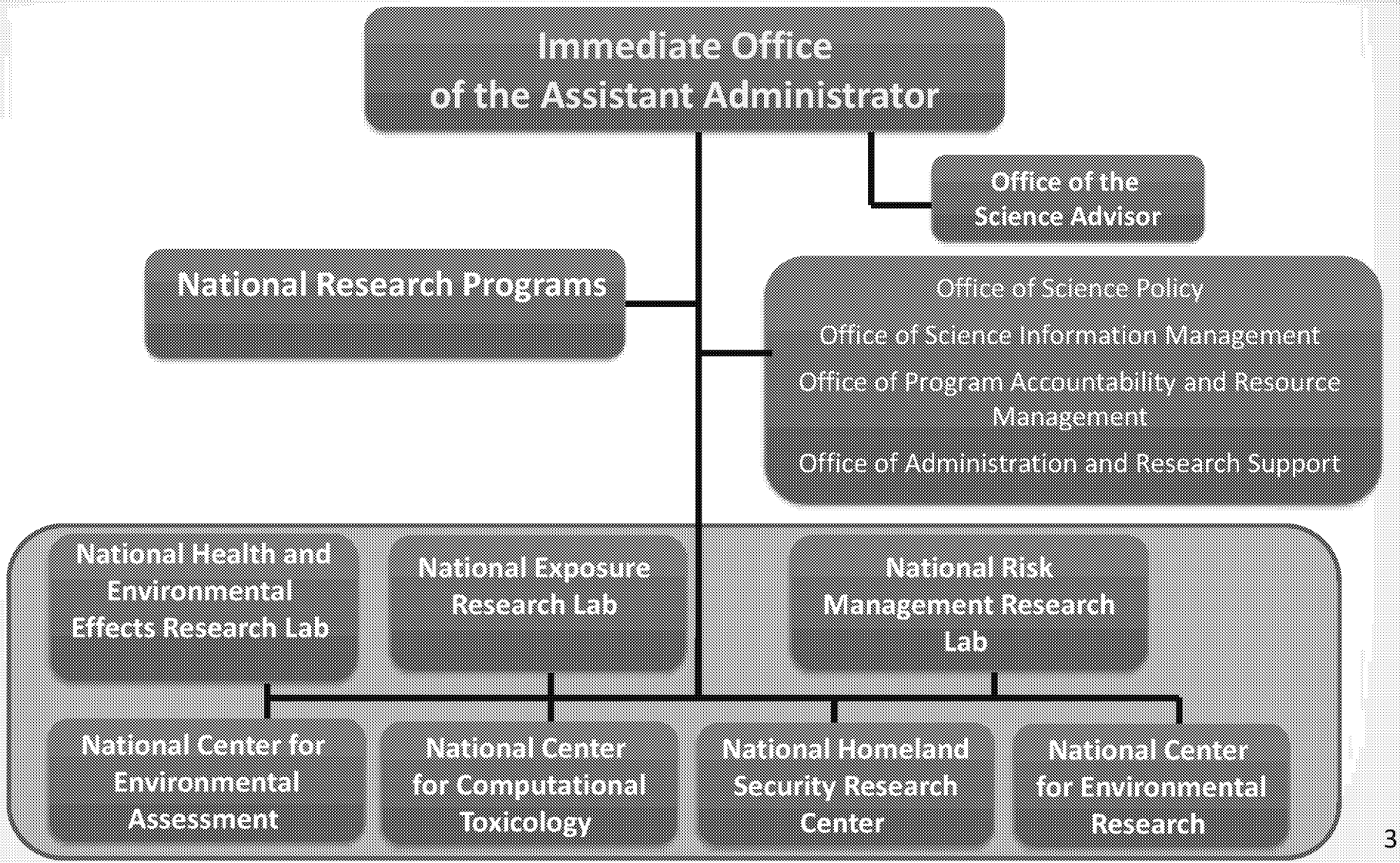
$492.1 million budget

$28.5million extramural research grant program (STAR)

11 research facilities

(FY 2018 Operating Plan)

ORD Organizational Chart



Research Authorization

US EPA's research provides science that is authorized by nearly 50 environmental laws including:

- **Toxic Substances Control Act:** "conduct such research, development, and monitoring as is necessary to carry out the purposes of this Act. The Administrator may enter into contracts and may make grants for research, development, and monitoring under this subsection."
- **Safe Drinking Water Act**: "conduct research, studies, and demonstrations relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and other impairments of man resulting directly or indirectly from contaminants in water, or to the provision of a dependably safe supply of drinking water."
- **Comprehensive Environmental Response, Compensation, and Liability Act:** "shall assure the initiation of a program of research designed to determine the health effects (and techniques for development of methods to determine such health effects) of such substance…and in combination with other substances with which it is commonly found."
- **Clean Air Act:** "shall establish a national research and development program for the prevention and control of air pollution."

ORD Research

ORD provides the scientific foundation for US EPA to execute its mandate to protect human health and the environment.

1. **Longer Term Research**: Conducts ***innovative and anticipatory*** research applied to a range of US EPA program and regional needs to solve longer term environmental challenges and provide the basis of future environmental protection.
2. **Research on Statutory Requirements and Specific Environmental Challenges**: Experts provide research support to US EPA program and regional offices, as well as states, tribes and communities, to help them respond to contemporary environmental challenges.
3. **Technical and Emergency Support**: Because of our expertise, local, state and national officials come to us for technical support to respond to environmental crises and needs, large and small.

National Research Programs

Air and Energy

- *Air pollution*
- *Air quality monitoring*
- *Decision support tools*

Sustainable & Healthy Communities

- *Ecosystem services*
- *Human health*
- *Sustainable materials management*
- *Superfund*

Safe & Sustainable Water Resources

- *Watersheds/recreational waters*
- *Nutrients and harmful algal blooms (HABs)*
- *Water treatment and infrastructure*

Chemical Safety for Sustainability

- *Computational toxicology and exposure*
- *Evaluation of risk across life cycle of manufactured chemicals, materials and products*

Human Health Risk Assessment

- *Risk assessments for specific chemicals*
- *Risk assessment methods*

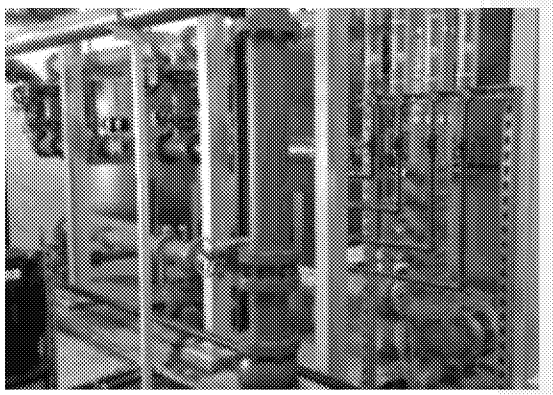
Homeland Security

- *Water system security*
- *Resilience and remediating wide areas*

State Engagement

ORD regularly engages with state agencies to ensure states' environmental science needs are being met and to provide science-based tools, approaches and methods, technical support and training

- **State Research Needs**
  - ECOS/Environmental Research Institute of the States surveys
- ***ECOS and ORD: Partners for Meeting State Research Needs*, Sept 2017**
  - This summary compiles 78 stories of how ORD research and technical assistance during the past 5 years supported states; new edition coming later this month
- **Memorandum of Agreement (MOA) with ECOS and ASTHO**
  - Recent project on how states communicate the risks of per- and poly-fluorinated alkyl substances (PFAS) and harmful algal blooms (HABs)
- **Webinars on Research Products and Tools**
  - *EPA Tools & Resources* monthly public webinar series
- **Outreach and Collaboration**
  - Lab visits to share ORD science & technical capabilities and discuss topics of interest to states and their science needs



"Ammonia residual in the distribution system can cause nitrification and other operational 'nightmares.' This EPA ORD supported pilot project in Palo is successful and the use of biologically active filters is an innovative, emerging drinking water technology that can be a viable option for certain other systems." — Bill Ehm, Director, Environmental Services Division, Iowa Dept. of Natural Resources

Assessing Cancer Risks
Louisiana

Partner: Louisiana Department of Environmental Quality (LDEQ); LaPlace, LA
Challenge: Potential cancer risks from emissions of chloroprene (completed)
Resource: IRIS assessment and air quality monitoring

- EPA ORD scientists assisted Region 6 (South Central) and Louisiana with their evaluation of potential cancer risks of chloroprene emissions from the Denka Performance Elastomer facility in LaPlace.

- Ambient air monitoring near the facility showed high levels of chloroprene in the area. EPA researchers worked to characterize potential health risks associated with chloroprene.

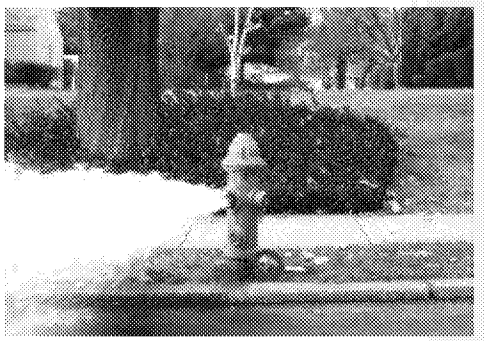
- EPA directly supported Louisiana in achieving action to reduce public health risks from the chloroprene emissions.

"I want to thank EPA ORD for their assistance in gathering and interpreting air quality data from around the Denka Performance Elastomer facility in LaPlace, LA. The information ORD provided helped the LDEQ design and implement actions to reduce chloroprene emissions from the plant. The multi-step Denka remedy is in the first stages of its implementation and has already produced significant reductions in chloroprene emissions. When agencies work together, everyone benefits." — LDEQ Secretary Dr. Chuck Carr Brown

Corpus Christi Water Contamination

Texas

Partner: Texas Commission on Environmental Quality (TCEQ), Texas Department of State Health Services (DSHS) and City of Corpus Christi
Challenge: Chemical contamination in Corpus Christi's water supply (completed)
Resources: Determine health risks and action level



- In December 2016, EPA ORD scientists and Region 6 (South Central) responded to a request to assist Texas after an asphalt emulsifying agent, Indulin AA-86, contaminated Corpus Christi's water supply. Toxicity information as well as treatment options to remove this chemical from water were lacking.

- ORD researchers provided assistance early in the response for decontamination approaches that might be suitable to remove the contaminant from the system. EPA helped dissect the chemical's toxicity and possible risks associated with ingestion of contaminated water and the water soluble salt from the product.

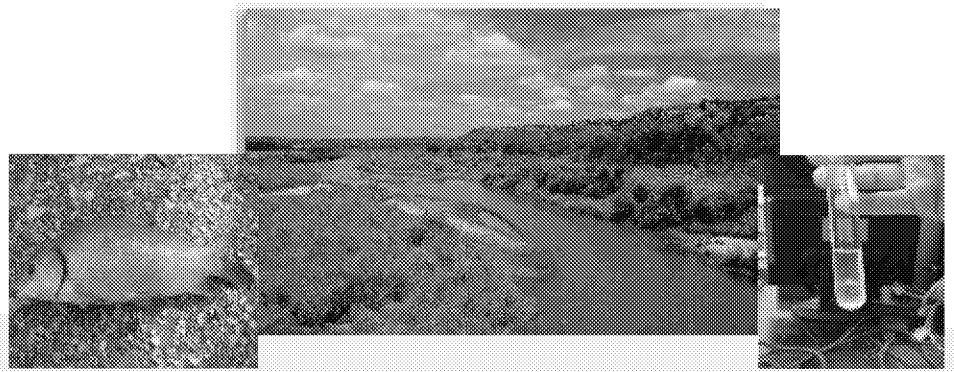
- TCEQ and the Texas DSHS, along with ORD researchers, worked together to establish a health-based action level for the contaminant and supported an immediate need to protect public health.

"The water situation in Corpus Christi last December was a good example of cooperation between Texas and EPA and the success we have when all work towards solving an environmental issue."
—TCEQ Chairman
Bryan W. Shaw, PhD, PE

Red River Fish Kills
Oklahoma

Partner: Oklahoma Department of Environmental Quality
Challenge: Fish kills and unknown contamination
Resource: Chemical Composition Analysis

- Unknown contaminants were present during four fish kills in the Red River watershed.
- EPA scientists identified the contaminants to be stray gases from an unknown source.
- EPA assisted with overseeing further chemical analysis that determined the gases were from a natural, biogenic source.



"EPA ORD's National Exposure Research Laboratory was a valuable asset during Oklahoma DEQ's investigation into the Red River fish kills. This facility's expertise and analytical technologies assisted with researching potential causative agents related to these fish kills. In addition, I strongly support the mission of ORD to conduct valuable research that leads to improvements in the continued protection of public health and the environment." —Oklahoma DEQ Executive Director Scott Thompson

EPA Research Supports States & Tribes

Some Recent Examples

10

AK – PFAS
ID – Modeling for agriculture, energy, water and air systems interactions
OR – Water nitrate contamination; Tools to help communities identify environmental issues; Ocean acidification research; Reducing methyl mercury levels; Advanced monitoring technologies
WA – Managing nutrients in riparian ecosystems; Habitat suitability models

9

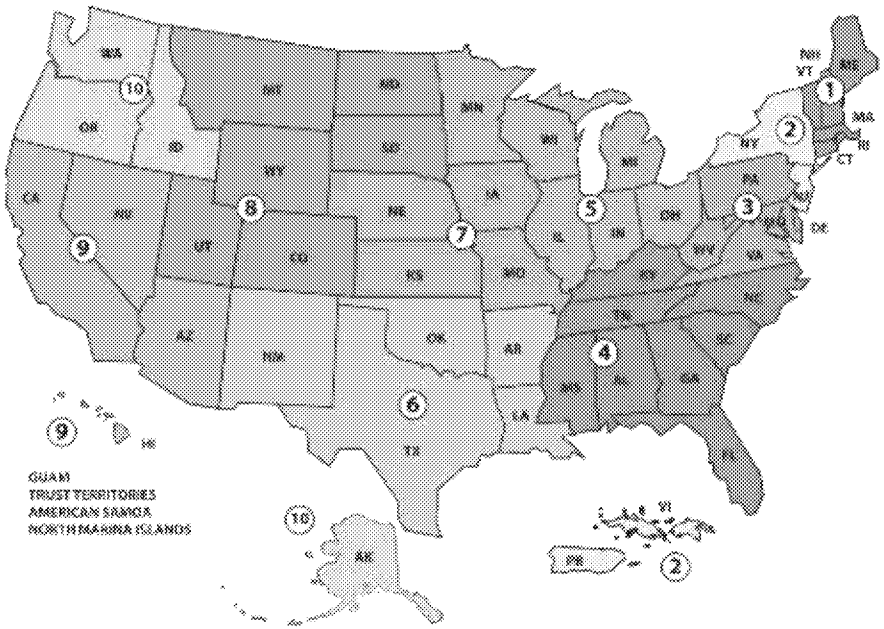
CA – Evaluating chemicals; Population and land use projections; Synthetic turf field safety; Decontaminating subway railcars; Decision support tools to advance communities' priority projects; Risk assessment training; Advanced monitoring technologies
NV – Groundwater characterization and remediation

8

CO – Simulating conditions in drinking water utilities; Advanced monitoring technologies
MT – IRIS assessment for Libby Amphibole Asbestos; Asbestos exposure following forest fires
UT – Fine particle air pollution; Emissions measurement methods

7

IA – High ammonia levels in drinking water
KS – Prairie rangeland burning; Community air quality monitoring
MO – Models and tools to reduce sewer overflows



6

LA – Cancer risk assessments
OK and **TX** – Community air quality monitoring
OK – Chemical composition analysis; Evaluating water interactions at Superfund site
TX – Chemical contamination risks

5

MI – Lead contamination technical support; Simulating conditions in drinking water utilities
MN – Sulfate standard development support; Modeling bioaccumulation of PCBs and mercury in fish
OH – Harmful algal blooms limiting drinking water; Managing algal toxins; Small drinking water systems; Simulating conditions in drinking water utilities
WI – Predicting water quality at beaches

1

CT – Community air quality monitoring;
CT, MA, ME , NH, RI and **VT** – Stream monitoring network; Planning for energy and air emissions
CT and **NH** – Advanced monitoring technologies
ME – Tribal risk assessment (sediment and water quality)
VT – Impervious cover data for watersheds

2

NJ and **NY** – Stream monitoring network; Planning for energy and air emissions
NJ – PFAS
NY – Management of bio-hazardous wastes; Planning for biological incident; Simulating conditions in drinking water utilities

3

DE, MD, PA, VA and **WV** – Stream monitoring network
MD – Managing stormwater treatment systems; Advanced monitoring technologies; Reducing harmful air pollutants; Management of bio-hazardous wastes
MD, PA and VA – Stormwater management planning support
PA – CADDIS causal assessment; Community air quality monitoring

4

AL, GA, KY, NC, SC, TN – Stream monitoring network
FL, GA, KY, NC, SC, TN – Characterizing urban background levels for contaminated site cleanup levels
FL, KY – Simulating conditions in drinking water utilities
GA – Green infrastructure in Atlanta's Proctor Creek
KY – Advanced monitoring technologies
MS – Fecal bacterial and viral indicators
NC – Community air quality monitoring; STEM education; Wright Chemical Superfund Site
SC – Food waste reduction

https://www.epa.gov/research/us-epa-office-research-and-development-and-environmental-council-states-partners-meeting

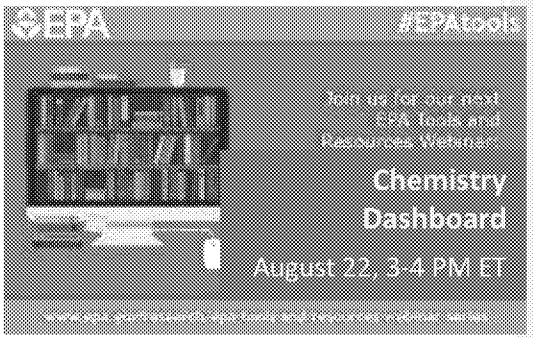
Other Emergency Response

- **ReAChback for Emergency Response**
  - Quick-response scientific support capability to ensure coordinated, timely response to large-scale disasters
- **Ebola Response**
  - Responded to Ebola patients in U.S. by identifying decontamination methods for vehicles, facilities, and Personal Protective Equipment for health care workers, technical support for waste management, and the fate of the virus in wastewater
- **Gold King Mine**
  - Provided toxicity information and developed modeling for long-term monitoring
- **Elevating Critical Public Health Issues Policy**
  - Developed a process to allow staff to expedite the elevation of important issues

ORD Support to Tribes, Tribal Science and Tribal Research

- **Regional Collaboration on Voluntary Drinking Water Testing for Lead in Tribal Schools**
  - ORD has assisted with the sampling protocol that EPA Region 6 is implementing to sample tribal schools under the 3Ts (Training, Testing, and Telling) for reducing lead in school drinking water
- **Regional Applied Research Effort (RARE) Projects and Regional Sustainability and Environmental Sciences Research (RESES) Program**
  - Example: **Waterborne Infection Risk Evaluation (WIRE) study** (Choctaw Nation of Oklahoma, 2017; Cherokee Nation, 2018-2019) – EPA researchers are working with colleagues in EPA Region 6 to conduct studies on the occurrence of waterborne and other infections in tribal populations
- **Science to Achieve Results (STAR) Tribal Environmental Health Research Program**
  - Example: Grant award to the **University of Tulsa** (Tulsa, OK) to examine ways to improve indoor air quality and reduce environmental asthma triggers in tribal homes/schools
    https://www.epa.gov/research-grants/tribal-environmental-health-research
- **EPA Tribal Science Council**
  - Established in 2001 at the National Tribal Caucus request to provide scientific support in Indian country
  - Forum for interaction between tribes and EPA to collaborate on important science issues
  - Membership includes both EPA and tribal scientists, with representatives from EPA program and regional offices

Research Products and Tools



To help ensure that the tools and resources EPA develops are accessible and useful to needs on the ground, ORD hosts a monthly *EPA Tools and Resources* webinar series to share our research, demonstrate tools and seek input from our partners

Webinar Topics:

- ✓ Publically available, easily understandable, and not overly technical
- ✓ Relevant to identified state & tribal science needs, including case studies
- ✓ Highlighting work at the nexus of public health and the environment

When?

Generally the **3rd Wednesday of every month**, 3-4 PM ET

Past webinars and upcoming registration at:
https://www.epa.gov/research/epa-tools-and-resources-webinar-series

Risk Communication of Waterborne Contaminants (PFAS and HABs)

- ECOS and the Association of State and Territorial Health Officials (ASTHO) worked on a recent project with EPA to highlight state-level risk communication of PFAS and harmful algal blooms (HABs)

- ASTHO and ECOS interviewed health and environmental agency staff from 13 states about their risk communication strategies and lessons learned for either PFAS contamination or HABs
  - ECOS states for PFAS state case studies (**PA, MI** and **NH**); ASTHO states (**CO, MN** and **NY**)
  - ECOS states for HABs state case studies (**MO, NC, OH** and **UT**); ASTHO states (**IN, OR** and **VT**)

- Results were compiled into brief case studies that outline the states' overall efforts, risk communication efforts, relevant resources, key messages for the public, and challenges in the states' programs or communications

- Public webinars in June 2018 provided key findings from the case studies and offered potential considerations to others seeking to implement or improve their risk communication practices

→ State Case Studies at: https://www.ecos.org/documents/state-level-risk-communication-of-pfas-and-habs/

ECOS-EPA Bimonthly PFAS Calls

Coordinate calls with ECOS/states to share information on PFAS human health/toxicity, analytical methods, site characterization/exposure and remediation/treatment work (Next call is scheduled Aug. 20, 4-5 pm ET)

For More Information

- **EPA Research web page**
  www.epa.gov/research
  - **States and ORD: Partners to Meet State Research Needs**
    https://www.epa.gov/research/states-and-ord-partners-meet-state-research-needs
  - **EPA Tools and Resources webinar series**
    https://www.epa.gov/research/epa-tools-and-resources-webinar-series
  - **EPA ORD Strategic Research Action Plans**
    http://www.epa.gov/research/strategic-research-action-plans
  - **EPA Methods, Models, Tools and Databases**
    https://www.epa.gov/research/methods-models-tools-and-databases
- **EPA Science Inventory**
  https://cfpub.epa.gov/si/
- **EPA Science Matters newsletter**
  https://www.epa.gov/sciencematters
- **It All Starts with Science blog**
  http://blog.epa.gov/science/
- **Join more than 100,000 followers on Twitter (@EPAresearch)**
  https://twitter.com/EPAresearch